

WITT SOLAR

ENERGY SYSTEMS AND SEAWATER DISTILLATION



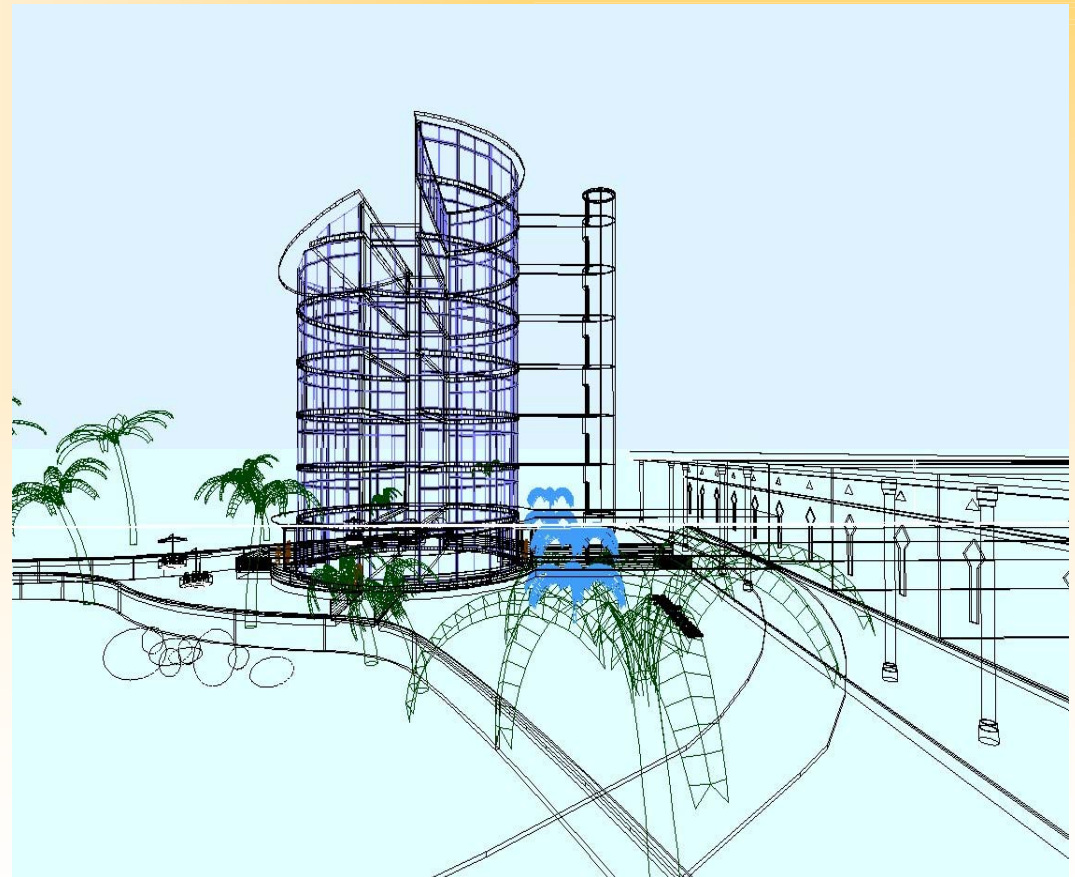
Welcome

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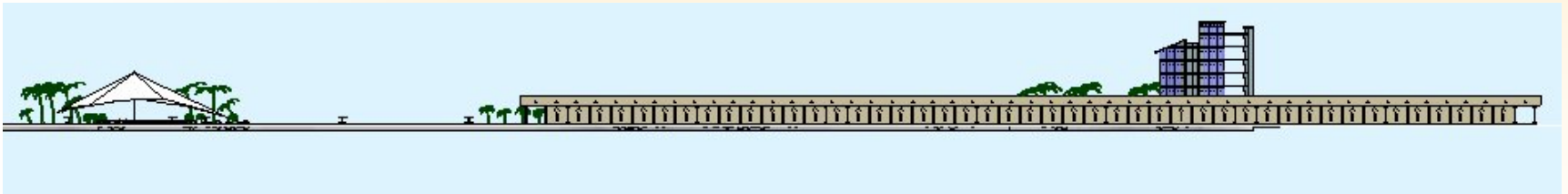


Introduction

- WITT SOLAR's activities are in the fields of seawater desalination, energy systems and cooling technologies.
- We work on the development, engineering and supply of innovative systems for these business fields.
- We always focus on economic, lasting and environment-friendly solutions.

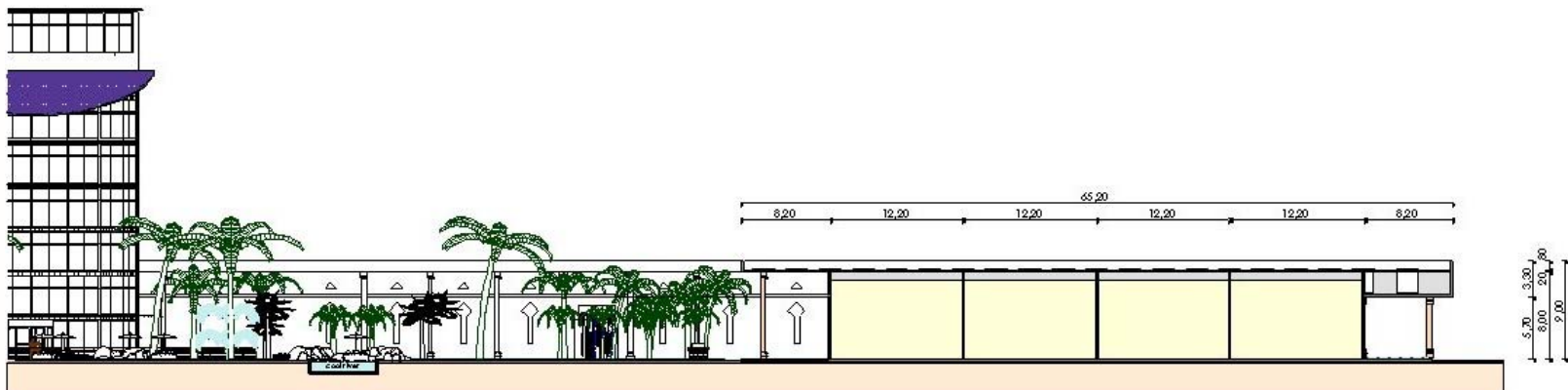
Products

- MES Desalination Plants
- Solar thermal energy plants
- Area Cooling Technology (ACT)
- Heat exchanger
- High Concentrated Brine (HCB)



Engineering

- Planning of projects for the production of water and energy
- Planning of projects for the ACT (Area Cooling Technology)
- Architectural and civil planning for demanding projects
- Supervision & Commissioning



Services

- Technical feasibility studies for new and existing technologies
- Integration of regenerative and fossil energy resources under technical, economical and environmental aspects
- Creation continental energy & water scenarios
- Environmental analysis of coastal regions



Purpose of Multi- Effect- Solar (MES) Desalination Plants

- MES- Technology has been developed to still exist in the future, when oil and gas cannot any longer be fired in power plants and desalination plants.
- MES Desalination Plants are ideal for desert locations because they need little cooling water and no additional raw water, when installed behind existing desalination plants.
- High efficiency allows to save existing water resources and the production of high concentrated brine as by-product for salt and oil industry.

MES Desalination Plants produce drinking water with a salt concentration of 20- 200 mg/l from

- Brackish water (raw water salt concentration 1- 20 g/l)
- Seawater (raw water salt concentration 20- 50 g/l)
- Brine from existing desalination plants (raw water salt concentration 50- 80 g/l)
- Special projects (raw water salt concentration 80- 170 g/l)
- Possible locations: onshore, offshore, sabkhas

Retrofitting of existing desalination plants

- No additional wells or seawater intake
- Converting brine from RO- or MSF plants into drinking water
- Increasing the recovery rate between 40 % and over 90 %

Economic production of thermal energy

- The Hot-Water-Storage (HWS), developed by WITT SOLAR AG, is a combination of a heat storage and a large-scale solar collector.
- It is worldwide the first time that heat generated with a solar application is cheaper than waste heat from thermal power plants.
- Therefore the MES- Technology provides very economically thermal energy for the desalination of seawater.

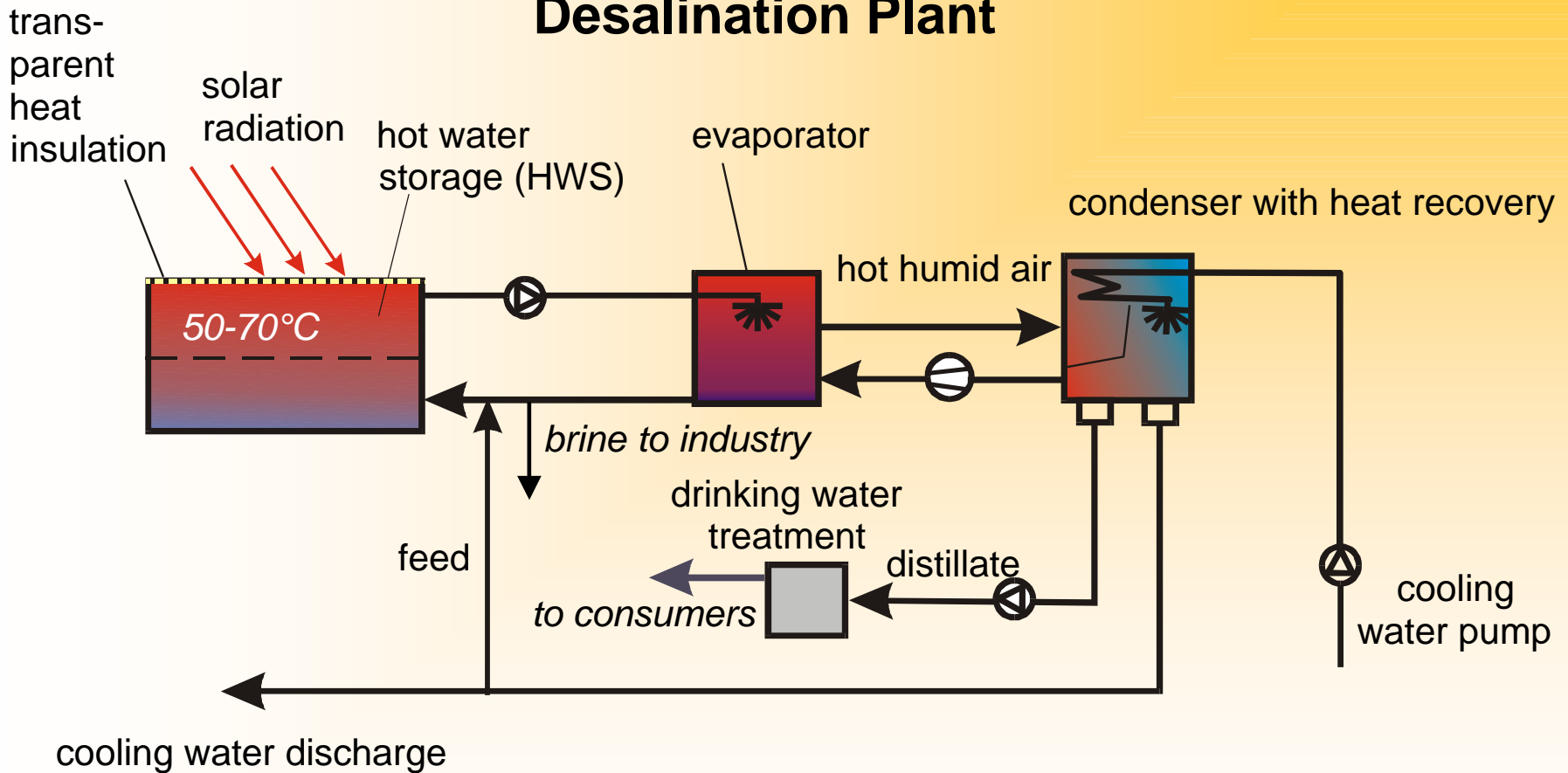
Low running costs lead to low total water costs

- The electrical energy consumption for the desalination of sea water and brine with MES Desalination Plants is in the range of 1,6-2,8 kWh/m³ also for high salt concentrations.
- Instead of metals, only heat resistant plastic material is used for pipes and heat exchangers. Therefore no dosage of anticorrosion is necessary in MES Desalination Plants.
- Water production costs even of the largest existing desalination plants can be undercut with MES Desalination Plants.

Advantages of Multi-Effect-Solar (MES) Desalination Plants

- Economical technology for desalination of sea water
- Maintenance friendly technology
- Converting brine from existing desalination plants
- Zero Discharge Desalination Process
 - Avoiding increasing salt concentration in ground water
 - Avoiding white spots in the Arabian Gulf
- High local value-added from construction and assembly

WITT SOLAR MES Desalination Plant



European Patent 1 108 191 B1
German Patent 198 38 481
US-Patent 6,367,257 B1

Projects Studies



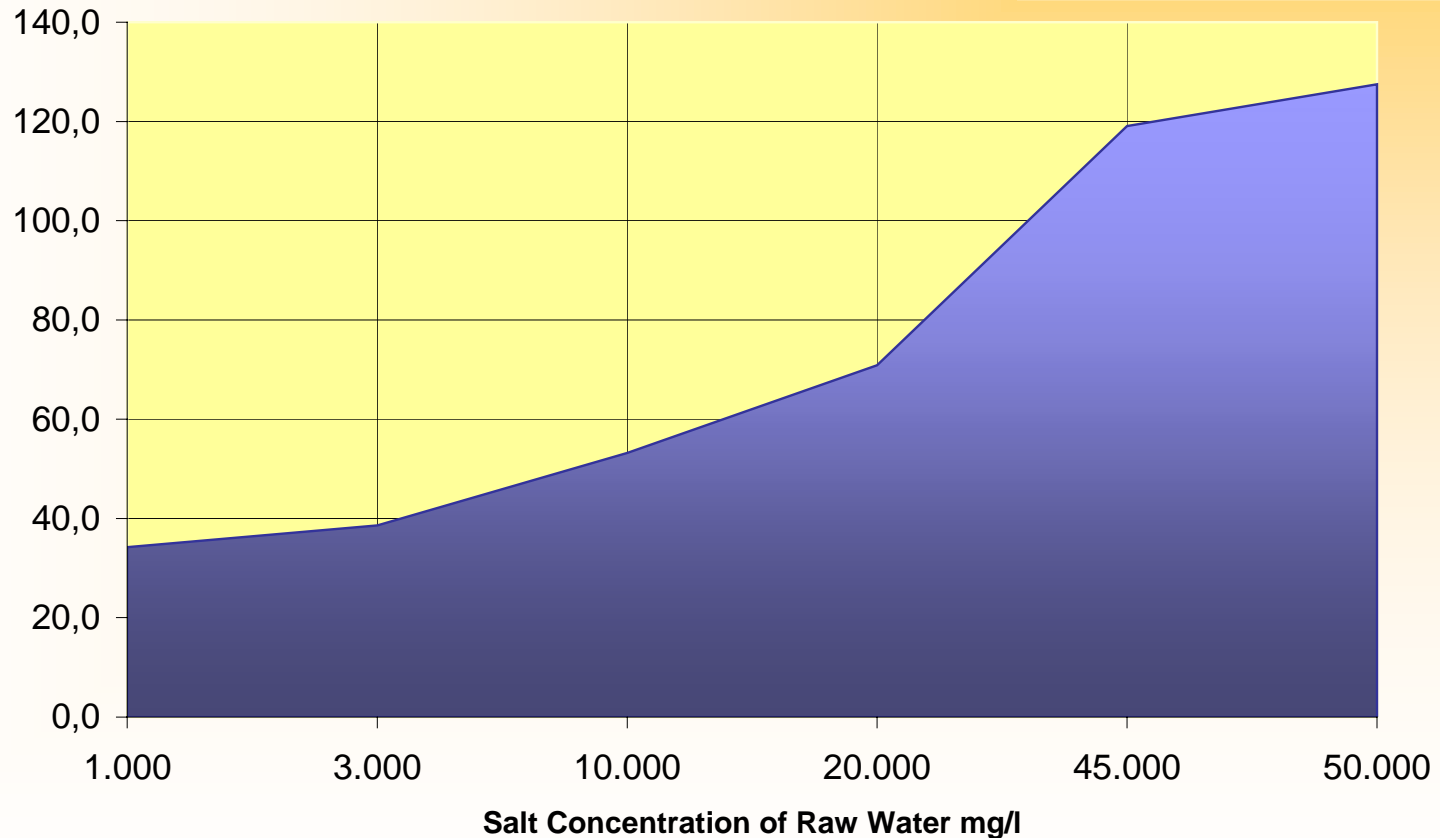
- COOL RIVER PROJECT with MES Desalination & Cooling Plant
- Desalination and cooling for Dubai's new projects
- 150.000 m³/d drinking water from MES Desalination Plant

Combined Plants converting brackish water into drinking water in Deserts

- Conventional technology :
Disposal of brine in the ground or evaporation ponds
- New laws:
Forbid disposal of brine in the ground
- Technology from WITT SOLAR :
 - Additional drinking water without new wells
 - Solving the brine problem

Improvement of Recovery Rate (Efficiency) of RO plants, when retrofitted with MES Desalination Plants

Improvement of Recovery
Rate %

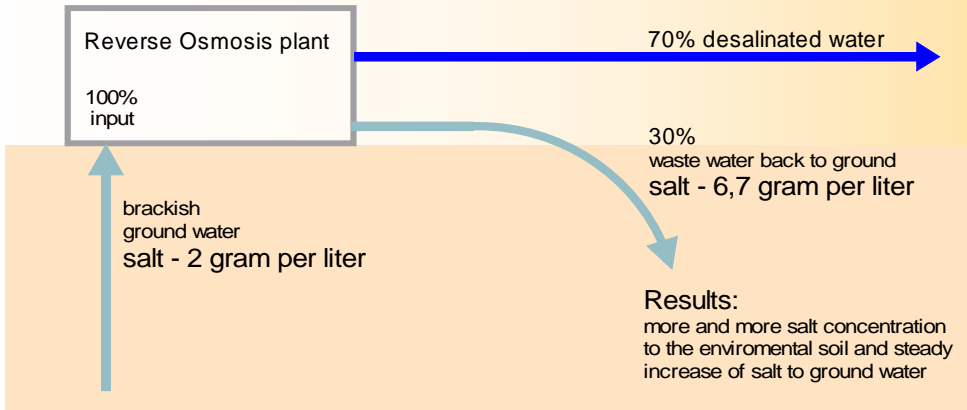


Zero Discharge Desalination with Advanced Low Space Evaporation Pond Technology

- Less necessary space than for existing evaporation ponds
 - Where evaporation ponds already exist, they can partially be used and combined with MES technology
 - The rest of ponds will be available for extension of water production or as solar ponds
- Production of high concentrated salt solution (brine) for industrial processes (salt production, better exploration of oil fields by re-injection of brine)
- No far distance pumping and piping costs for the brine
- Increasing the existing water output

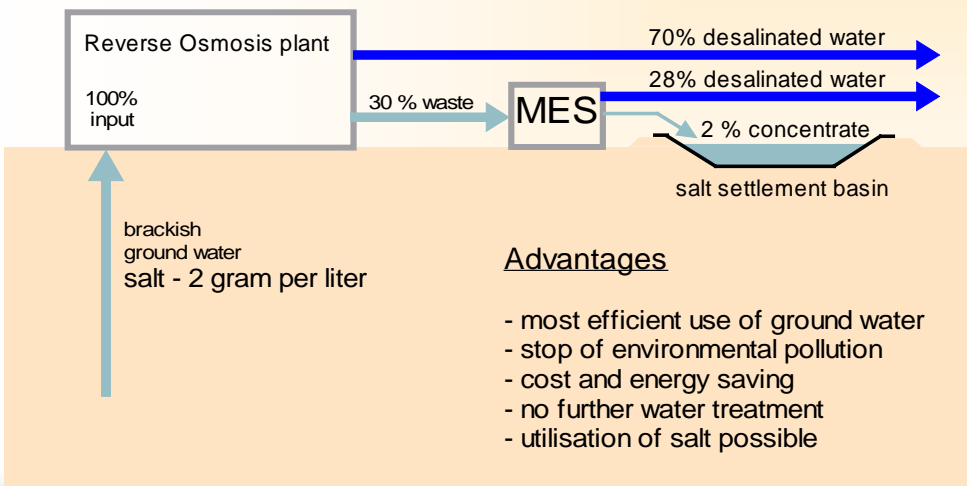
Zero Discharge Desalination Process

Situation for brackish water desalination by use of RO technology only



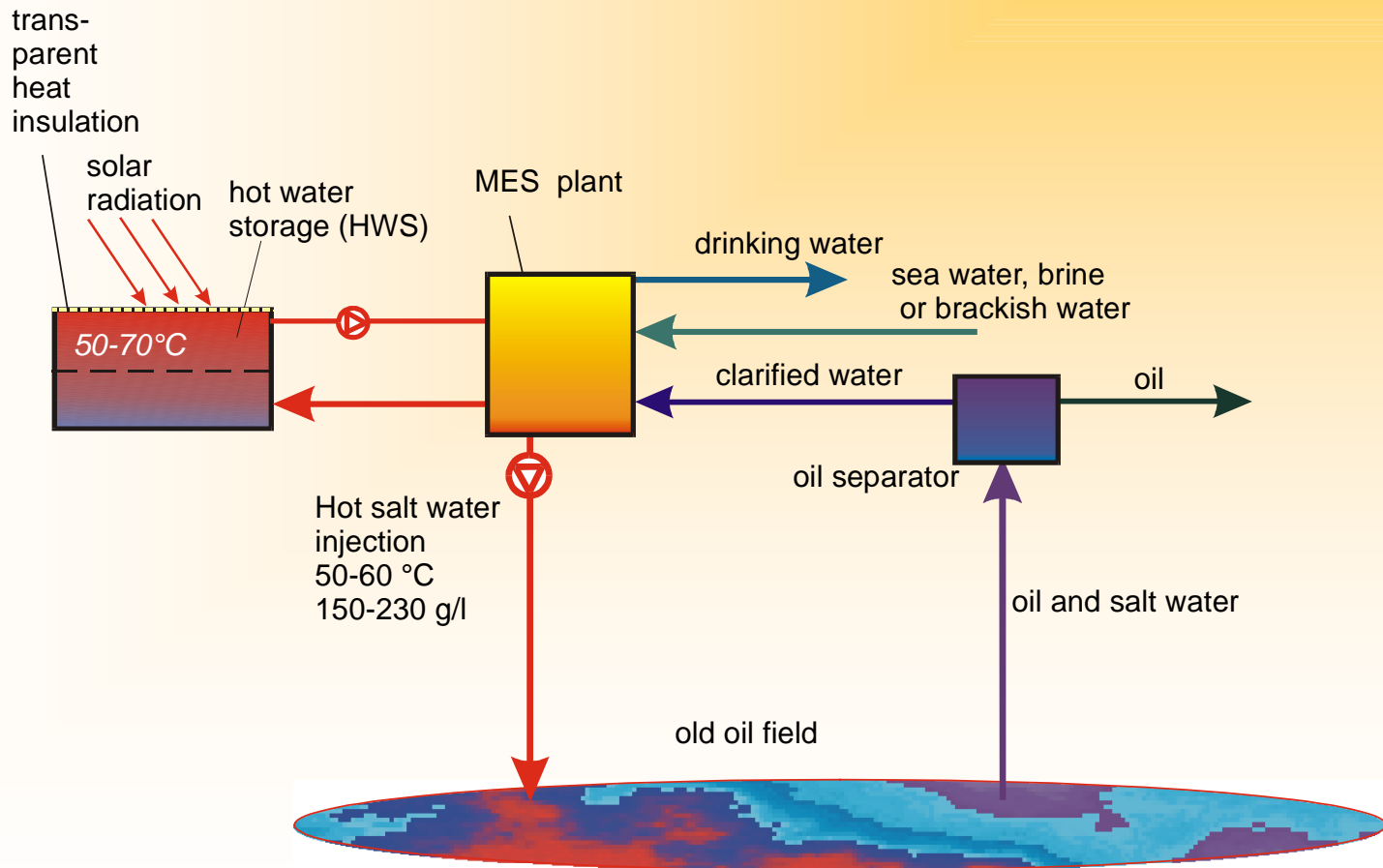
- Wherever an increase of drinking water production demands for an extension of the existing plant, Multi-Effect- Solar (MES) Desalination Plants are the solution without the construction of an additional seawater intake or new wells.

Combined desalination plants



- The higher the salt concentration of the raw water, the better the increase of recovery rate with MES Retrofitting is possible. When the existing brine flow is higher, than the drinking water production, we might be able to double the drinking water capacity.

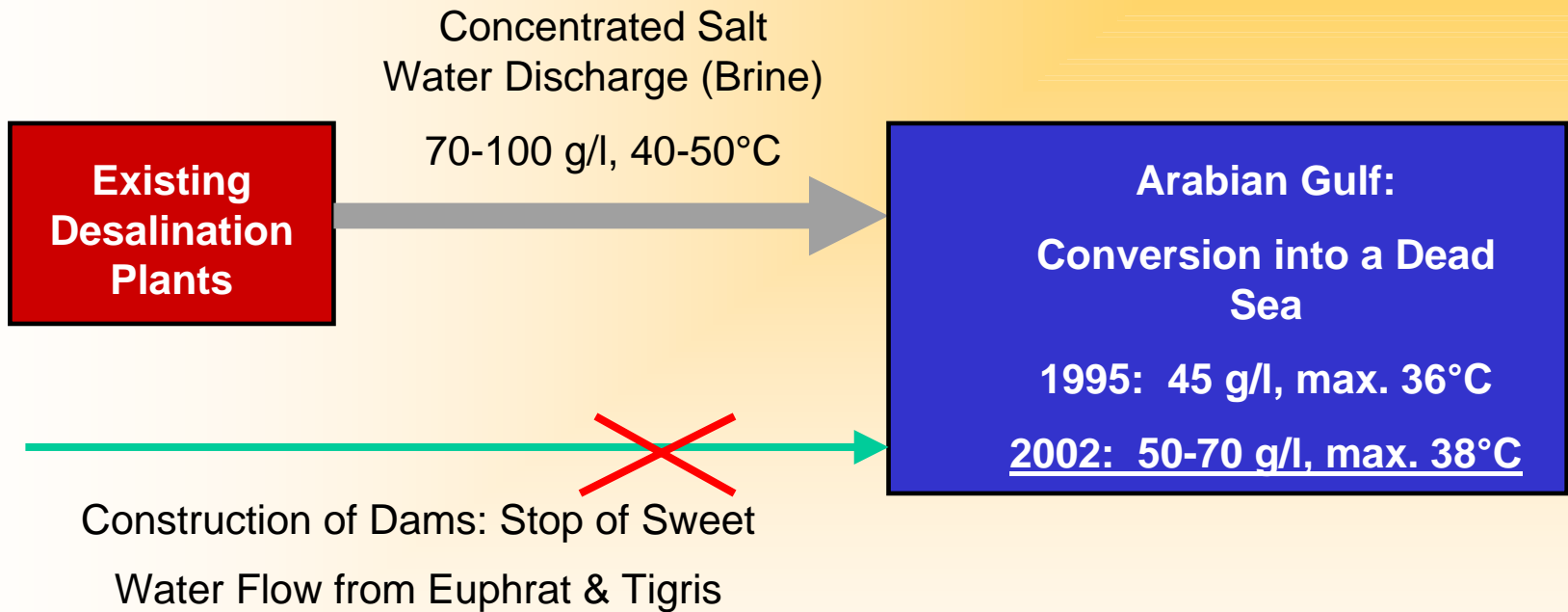
Increased Oil Production with Salt Water Injection from WITT SOLAR MES Desalination and Brine Concentration Plants



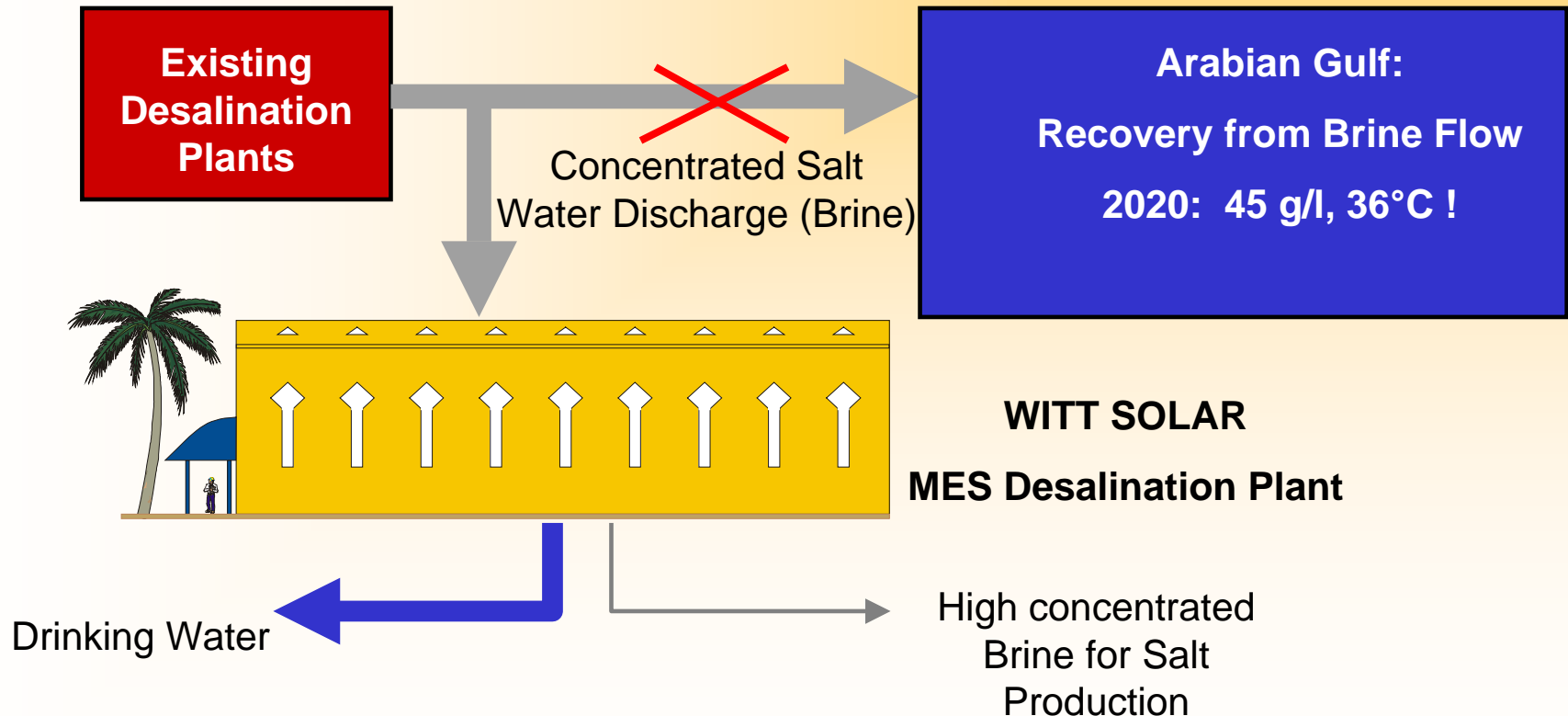
Unique Selling Position (USP)

- Collection and storage of solar energy at extremely low costs
- Offshore plants allow the solution of increasing salinity in the Arabian Gulf
- **Unique discharge-free desalination technology („Zero discharge desalination process“)**
- Retro-fitting as a second stage behind each existing desalination plant possible
- Delivery of highly concentrated brine as a by-product

Situation at the Arabian Gulf



USP: Solution for the Arabian Gulf with WITT SOLAR MES-Desalination Plants



Advantages of Retrofitting the existing Desalination Plants with MES Technology

- Increasing the total recovery rate of desalination plants at the Gulf from 40 % to 90 %
- No additional intake, screening plant, fine filter, dosing plant is necessary, because it is designed for 100 % of the raw water
- Instead of brine discharge to the Gulf, production of high concentrated brine with additional revenues

Differences between MES and other Desalination Systems

	RO	MES	MSF	MED
Max. economical Raw water concentration g/l	50	100	70	70
Electrical energy consumption kWh/m ³	3,5-6	1,6-2,5	6-8	2-3
Brine inlet temperature °C	-	45-80	85-110	63-80
Heat source	-	Solar or waste heat	Gas or oil (solar)	Gas or oil (solar)

Thank you for listening.
Please visit us at our stand Q 1, Hall 3

